CLAIMS

1. Process for determining the mechanical resistance of a bone from a digitized two dimensional image, obtained by imaging, characterized in that there is carried out a correlation between the bone mineral density determined from this two dimensional image by any means suitable to this type of image and a structural parameter obtained from the same two dimensional image.

2. Process for determining the mechanical resistance of a bone according to claim 1, characterized in that one has recourse to a correlation of the exponential type.

3. Process for determination according to claim 1 or 2, characterized in that the correlation associating the bone mineral density and said structural parameter is used to determine the ultimate stress C_u of the bone.

4. Process for determining the mechanical resistance of a bone according to any one of the preceding claims, characterized in that there is determined the structural parameter α obtained by the series of the following steps:

a) choosing at random a pixel of the two dimensional image which is at the gray level h(O),

b) choosing a straight line from this point having a direction also determined at random,

c) moving a distance r along this straight line, h(r) being the gray level of this new point,

d) computing the variance of the gray levels with the formula: $V(r) = [h(r) - h(O)]^2$,

e) tracing the curve associated with V(r) on a log-log scale, and

f) determining the slope of this log-log curve which represents said parameter $\underline{\alpha}$.

5. Process for determining the mechanical resistance of a bone according to claim 4, characterized in that steps a) to d) are repeated a number of times sufficiently great to make the mean variance function V(r) converge over the assembly of the repetitions.

6. Process for determining the mechanical resistance of a bone according to claim 4 or 5, characterized in that there is carried out a correlation between the bone mineral density obtained from this two dimensional image and said parameter $\underline{\alpha}$ evaluated from the same two dimensional image according to the mathematical model:

$$C_u' = b_0 + b_1 * \exp(b_2 * DMO) * \alpha$$

- wherein b_0, b_1, b_2 are coefficients obtained by nonlinear regression and C_u' the prediction of the ultimate stress C_u of the bone.

7. Process for determining the mechanical resistance of a bone according to any one of claims 4, 5 or 6, characterized in that there is determined a correlation between the parameter $\underline{\alpha}$ and a three dimensional parameter of the trabecular network of the bone.

8. Process for determining the mechanical resistance of a bone according to claim 7, characterized in that the three dimensional parameter of the trabecular network of the bone is the connectivity density χ_v